(54) Title: THE METHODS AND APPARATUS FOR BLIND SEPARATION OF MULTICHANNEL CONVOLUTIVE MIXTURES IN THE FREQUENCY DOMAIN
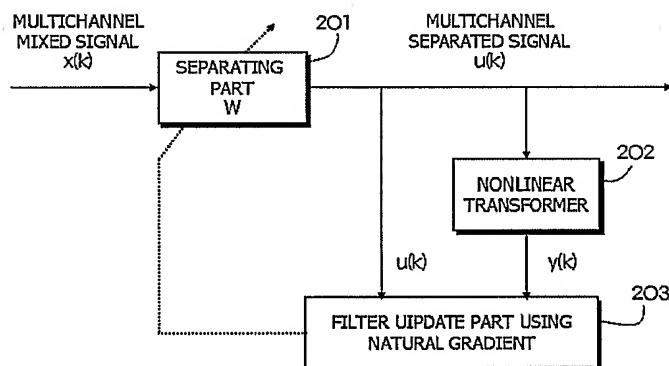
(57) Abstract: A method and apparatus is disclosed for performing blind source separation using frequency-domain normalized multichannel blind deconvolution. In an embodiment of this invention, the multichannel mixed signals are formed as frames of $N$ samples, which consist of $r$ consecutive blocks of $M$ samples. The frames of mixed signals are separated using separating filters in the frequency domain in an overlap-save manner using a discrete Fourier transform (DFT). The separated signals are then converted back into the time domain using the inverse DFT to be applied to a nonlinear function. The cross-power spectra between separated signals and nonlinear-transformed signals are computed and are normalized by the power spectra of separated signals and the power spectra of nonlinear-transformed signals to have flat spectra. The invention then applies the time domain constraint to preserve the first $L$ cross-correlations. These alias-free normalized cross-power spectra are further constrained by nonholonomic constraints. The invention then computes natural gradient by convolving alias-free normalized cross-power spectra with separating filters. After the length of separating filters is constrained to $L$, separating filters are updated using the natural gradient and normalized to have unit norm. The terminating conditions are checked to see if separating filters converged.